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ABSTRACT

The Women in Technology program, which ran for three years through the Open University, was a retraining program for qualified, experienced women technologists who had left paid employment for family reasons. It was designed to assist in the updating of technical knowledge and the promotion of confidence and skills in career planning for those women who were planning to return to professional work. This report focuses on one year of the Option 1 segment of the program, when 30 women began the first year of a 2-year retraining program with T101, the Open University's technology foundation course. Evaluation of the program is undertaken from several different perspectives, including the evaluation of student progress; evaluation by students of the course and the tutorial program; case studies of successful and unsuccessful students; and student evaluations of the summer school program, including concerns about domestic arrangements and sexist attitudes on the part of men students and tutors. Based on the findings of the evaluations, five ways to improve educational opportunities for women in this non-traditional area of study are suggested. (EW)

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MSC Manpower Services Commission
The Open University
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WOMEN IN TECHNOLOGY

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A Report to the Training Division of the Manpower Services Commission on the First Year of Option 1 for Women with No Technological Qualifications who Wish to Enter Technology

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1986

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FOREWORD

Women in Technology (WIT) ran for three years (1982-84 inclusive) as a retraining programme for qualified, experienced women technologists who had left paid employment for family reasons. It aimed to update their technical knowledge and promote confidence and skills in career planning for a return to professional work through continuing education while they were still at home. A final report on WIT Model I was produced in 1984, with a brief follow-up on career progress in April 1986. This report focuses only on the first year of Option 1 when thirty women began the first year of a two year retraining programme with the study of T101, the Open University's Technology foundation course, with bursaries funded by the Manpower Services Commission (MSC).

PART 1

THE SCHEME AND THE STUDENTS

CHAPTER I INTRODUCTION

1.1 The Basis for Development

Evidence in Interim Reports 1, 2 and 3, and the Final Report indicated that the aims of WIT I were being fulfilled. In summary 136 bursaries of £300 each had been awarded (including 9 for Northern Ireland from the Department of Economic Development, Belfast) to high calibre women students who obtained very satisfactory course results. Student drop-out was below average, and the record in obtaining employment was very encouraging. Additional justification for extending the scheme was provided by a survey conducted by the Survey Research Department of the Open University (OU) of enquirers who did not apply (1982), suggesting a future interest or a delayed application rather than a present one for a majority of those who did not apply.

Experience and observation of the scheme also provided evidence of the potential of WIT to operate as a conversion course, given a relevant component in previous education or working experience. There were women who for one reason or another, at an earlier stage in their education, had been advised away from the area of mathematics, science and technology. A small number of women with backgrounds in mathematics, geography and in two cases philosophy or modern languages combined with IBM working experience, had embarked on computing or electronics courses and coped well. One woman whose previous working experience had been in teaching mathematics was successful in her first job application after a career break of nine years, and after working as a Work Study Officer for a local authority for three years, joined an independent consultancy as a programmer on the break-up of the metropolitan county councils in April 1986.

The development of the project to aim at a wider target of women from a background further removed from the technological area but including at least one relevant element either from education or employment, it was suggested, would correspond well with both the MSC's paper 'Adult Training Strategy: Proposals for Action' and the aims of WISE (Women into Science and Engineering), whereby 1984 was specially designated by the Engineering Council and the Equal Opportunities Commission (EOC) to encourage girls and women into science and engineering.

However, for such a development to succeed both educational counselling and an introductory programme of study would be essential.

1.2 Aims of WIT II

A development of the original project was therefore proposed, with two options.

Option 1 (for students who would need two years)

(a) This would offer a two-stage course for women who did not have sufficient science/technology experience in their previous educational or working background to enter straight into the higher-level courses currently offered by WIT.

(b) Where appropriate such women would pursue a course of study such as T101, the Technology foundation course from the OU's undergraduate programme in year 1 (1985), followed by the study of a specialised course from the existing WIT profile in year 2 (1986).

(c) A commitment to provide a second bursary for students passing their first course would therefore be necessary.

Option 2 (for students who need only one year)

would continue the existing scheme for women technologists who wished to return to their profession.

Both options would be exclusive to women who were not currently in paid employment or had minimal paid employment (low-level of part-time work) and who were experiencing a career break in order to fulfil family obligations.

These proposals built on and formalised a modest trend towards conversion which arose from the original project. The nature of some enquiries also reinforced the desirability of providing foundation study in appropriate cases.

The award of a second bursary had already been approved exceptionally by MSC for seven students in 1982/83 and eight in 1983/84. These were either women who began

by bringing their engineering mathematics up to date in year 1, and then progressed to a specific technological area in year 2, or those who brought computing knowledge up to date in year 1, and then moved into microprocessing in year 2.

Option 1 extended this principle.

It was recognised that the project would inevitably become more complex, in all aspects: coordination and administration; advice and counselling at the enquiry stage; preparatory course provision; and career planning and vocational guidance.

1.3 Finance

The Manpower Services Commission (Training Division) agreed to fund an expanded project up to £42,000. This amount was to cover 70 bursaries, publicity, evaluation, administrative and overhead costs. As in previous years the Northern Ireland Department of Economic Development provided an additional 6 bursaries for women from the province, making a national total of 76 available bursaries. 30 of these were earmarked for T101, the Technology foundation course (Option 1) with 33 for higher level Associate courses and 7 for the Microprocessor and product design package (Option 2). Bursaries covered the cost of course fees, the preparatory weekend at the Centre for Extension Studies, University of Loughborough, summer school fees and related travelling expenses.

The OU funded an extra twenty days for the part-time Assistant Project Coordinator while the Project Coordinator and senior administrative staff in the Associate Student Central Office (ASCO) increased their work commitment to the project as part of their official output.

1.4 Structure

(a) Admissions and Support Services

Women in Technology remained at its base in the Yorkshire Regional Centre. Those involved in the running of WIT Model I felt an important factor in the scheme's success had been the informal, personal approach to an unconfident minority target group who wished to re-enter

areas of study and employment both of which are traditionally male-dominated. All those working most closely on the project are women.

Publicity directs all enquirers to the WIT office in Leeds from where further information and application forms are sent. With a choice of two options the amount and level of advice and counselling sharply increased, requiring an expansion of staff. The project has been fortunate to have the part-time services of two experienced women technologists. Enquiries are logged and details sent to the thirteen OU Regional Project Advisers to whom enquirers are referred after the initial contact with the Project Office.

Special procedures for identifying and registering WIT applicants were set up by the OU's Associate Student central administration in order to avoid involving further sections of the University. The meticulous care of the secretarial/ administrative staff in Leeds and ASCO has ensured the smooth running of a project covering a relatively small number of students within a nationwide university of 65,000.

(b) Bursary Awards

Copies of application forms (136) were forwarded to all members of the Awards Committee several weeks in advance of the award meeting. This enabled the members (representatives from the Project Staff, ASCO, Technology Faculty and Continuing Education) to give the necessary preliminary consideration before a plenary assessment.

(c) Research and Evaluation

WIT Model II has been fortunate in acquiring the services of a researcher, Gill Kirkup, from the OU's Institute of Educational Technology (IET) with substantial experience and interest in the issues of women studying in the technological area. Project staff have cooperated with her in producing a detailed evaluation schedule in conducting telephone interviews to check on course progress in April, face-to-face interviews at summer school and an end-of-year questionnaire. Sue Cox, responsible for the Loughborough courses, collaborated with an evaluation of the preparatory

weekend. Val Morrison, also in IET, was responsible for providing continuous assessment records at intervals throughout the year.

(d) Steering Group

A steering group composed of those MSC staff most closely involved, the Acting Senior Assistant Registrar from ASCO and the Project Coordinator met in August 1985 to review progress and is regularly in touch by telephone and letter.

Thanks to the support and advice of MSC staff, WIT II has now completed its second year.

CHAPTER II PUBLICITY AND APPLICATION PATTERNS

2.1 Promotional Activities

WIT Model II was to be aimed at a wider target group since Option 1 was planned for women who wished to move into the technological area from other vocational backgrounds. The switch to greater emphasis on press advertising which took place for year 3 of Model I was therefore pursued further. Advertisements were placed in three national dailies and two Sunday papers in early September to coincide with a press release from the OU's Information Services. This publicity led to a number of interviews on local radio stations, and references in a range of magazines including Cosmopolitan, the New Scientist and professional journals.

The cost of advertising was offset by again using a low-cost leaflet and poster printed locally. Substantial expertise has been built up over the three years of WIT I in developing a network of approaches to women's agencies of education and retraining. Leaflets were distributed also to 682 libraries nationwide, the thirteen OU Regional Centres and each region's summer school. Enquirers from previous years were also informed. Near the end of the application period (early October) an MSC slot on a North-West television programme This Is Your Right provoked a last-minute burst of enquiries.

Table 1 shows the response to publicity approaches.

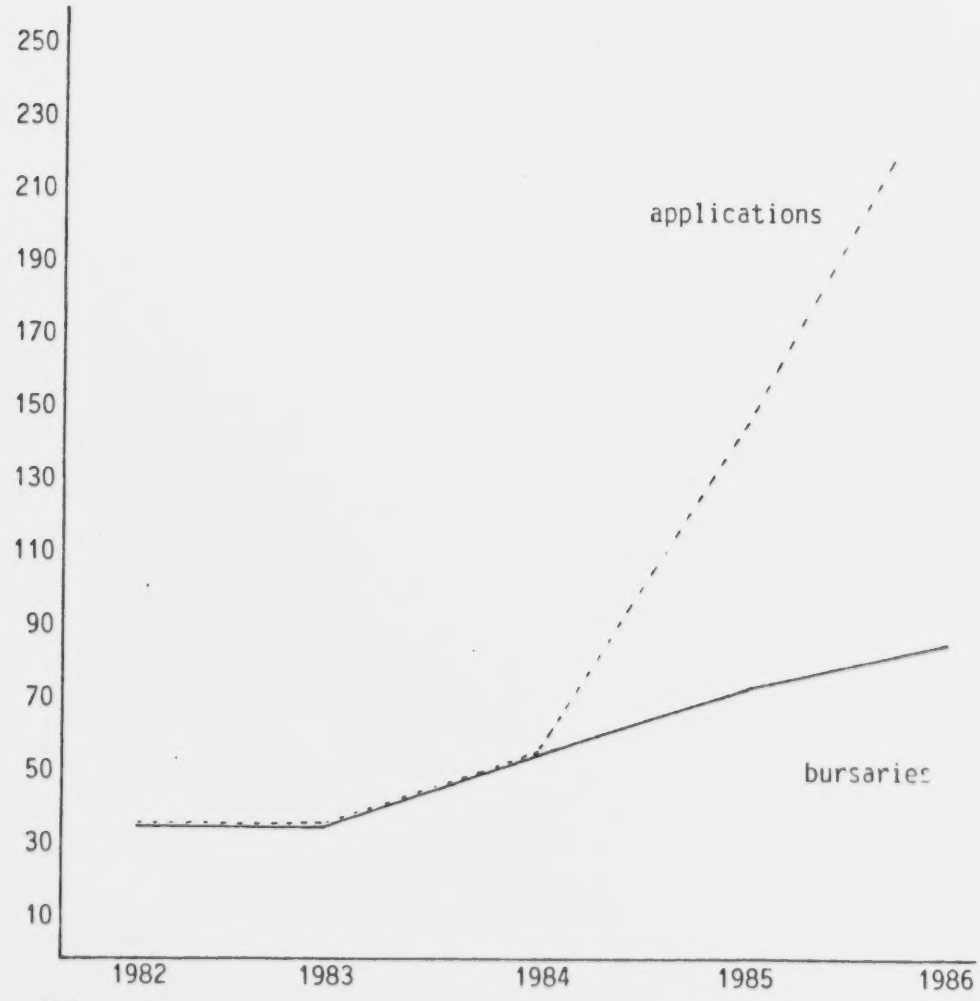
Table 1 Publicity - 1984 Enquirers

Leaflet	69
Press Advertisement	131
Press Release	37
Professional Journal	31
Informal OU Contact	4
Previous Enquirers	27
Current Students	5
Old Publicity	21
TV Programme	29
Unspecified	180
	534

The wider appeal of Model II resulted in a record number of enquirers. The trend from year 1 has been one of steady expansion (borne out by the enquiries for 1986) with no fall-off on the original option for qualified women technologists.

Table 2 shows the expansion.

Table 2 Expanding WIT



2.2 Advice to Enquirers

As mentioned earlier in 1.4(a) the choice between two options brought greatly increased pressure on the WIT advice and counselling service. Project staff are accustomed to the extremely tentative and self-

deprecating manner of enquiry from women who have lost public or professional confidence after a period at home. Most enquirers now also needed to discuss which option best suited their needs. The right choice for many individuals was by no means clear-cut. There were women with impressive previous qualifications and working experience who initially preferred the two year option simply through a severe lack of confidence; while other women with little or no previous technological experience were eager to tackle a more specialised higher-level course straight away. The aim was to enlighten or re-assure the enquirer so she could apply for a realistic course choice. In a small number of cases, applicants were contacted further at the award stage if the committee felt the wrong choice of options had been made.

2.3 Awards

From 534 enquiries were produced 136 applications - almost twice as many as the bursaries available (70 for Great Britain, 6 for Northern Ireland).

Table 3 shows the breakdown of awards by region and option.

Table 3 Awards by Region 1984 for Study in 1985

Region	Enquirers	Applicants		Awards	
		Option 1	Option 2	Option 1	Option 2
London	37	1	6	1	2
South	63	5	6	4	3
South West	38	5	3	4	2
West Midlands	34	8	8	2	4
East Midlands	31	4	4	1	2
East Anglia	47	5	6	1	4
Yorkshire & Humberside	33	2	4	2	3
North West	76	9	11	6	7
North	17	1	2	1	2
Wales	15	2	1	1	-
Scotland	76	17	14	7	10
Northern Ireland	15	-	4	-	4
South East	45	2	6	-	1
Others	7	-	-	-	-
	534	61	75	30	44
		136		74	

This report is concerned only with Option 1 in its first year, when thirty women new to technology studied the Technology foundation course.

CHAPTER III THE STUDENTS

3.1 Family Responsibilities

The students were almost all in their thirties when they applied for the scheme, the average age being 35, with the oldest student 45 and the youngest 28. They all had children. Six had one child, twelve two children, another six three children and two four children. The children, as would be expected from the ages of the women themselves, were young. Twelve students had children under five years old, and eighteen had children in the 5-10 age range. It was most common to have both a child under five as well as one or more others in the 5-10 group. One student's husband had spent many years as a chronic invalid, during which she had needed to look after him as well as their children. She was able to study now because he was much fitter than he had been for many years. This information suggests that these women will have significant family responsibilities in terms of childcare during their period of study. Five students described themselves as single parents, and will most probably be carrying this responsibility alone.

3.2 Previous Education

The group as a whole are highly qualified although the range of qualifications is wide. Nine students had first degrees, two in English, two in maths, others in French, geography, economics, sociology, and zoology/botany. Most of these had some post graduate qualifications such as a Post Graduate Certificate in Education or vocational training, eg banking qualifications or personnel management qualifications.

Three students had teacher training qualifications alone. Two had HNCs in chemistry. One had an ALA librarianship qualification. The remaining students with lower level qualifications had them in arts, four had A level qualifications, three had five or more O levels, five had fewer than five O levels. Only three students had no qualifications at all.

3.3 Previous Career

Despite the high level of educational qualifications, the job descriptions given by the students indicate that this level is not reflected in professional status. Only two students had jobs at higher levels of administration - one was an executive officer, one a manager in a small company. For example those with teaching qualifications and the majority of those with degrees were teachers: nine students. Two of the others with degrees had been an editorial assistant and a personnel officer. The two HNC chemists had, more appropriately perhaps, had laboratory jobs, one as an R & D research chemist, the other as a research technician. The employment patterns of the other students reflects that of women in general. Eight described their work as 'clerical', two as 'clerk/typists'. Two had gone into computer operations and another had been a punch card operator. Finally there was a librarian and a stage manager.

In order to apply for a bursary students needed to be out of employment for at least two years. On average most students had given up full-time work in the mid-1970s, one as long ago as 1965 and one as recently as 1981. Most students had made a clean break and stopped work completely to concentrate on looking after their children. However a few had periods of temporary, part-time or voluntary work.

3.4 Motivation

Why had students applied for this particular scheme?

All the students had been thinking for some time about returning to work, and retraining or updating. A few had only very vague notions about what they wanted and seeing the WIT advertisement started a completely new train of ideas for them. One had seen the advertisement and because her husband was already an OU student, she felt enthusiastic about beginning studying with the OU.

At least three students had husbands doing OU courses. This was both an encouragement because of their familiarity with the university system, but also meant that without a bursary the family could not have afforded two sets of fees.

For most students the main reasons for choosing to retrain in technology were to do with perceived job

opportunities and 'interesting' work, rather than a desire to study the subject for its own sake, although one student remarked that having a computer in the house (for the children) had stimulated her interest, and another had given up physics and chemistry at 13 and now felt technically 'ignorant'.

The majority of students had been looking for a way of entering technical retraining, for a year or more before applying for WIT. Some had tried unsuccessfully to get on to local courses. For example one had applied for a place on a computer course provided by a local firm, but the course had been cancelled because of lack of applicants. Something similar had happened to a potential BTEC computer studies course another student had applied for. One student had applied to do an MSc computer studies course (she had a first degree), but she was rejected because her level of maths was considered too low. One student was attending a part-time course at an ITEC at the same time as doing the WIT scheme.

All students felt that distance learning was certainly a good way to study because of their circumstances. Two students remarked on how they had identified potential courses at local colleges but had not applied due to the attendance requirements and the travelling. One student's family did not own a car, and travelling to study by public transport she found impossible; she remarked that the OU was "not just a good way" it was "the only way". Another had found a TOPS course in computing but it was on the opposite side of Birmingham from her home, and because of her children the travelling was impossible. One student had managed to do a basic computing course at night school but now she wanted more. In choosing to study technology, students were taking careful account of their prior work experience.

Many students were not sure of the kind of job they would like to enter, but were unwilling to return to their old job. There was a general rejection of office work, because of its mundane character and lack of career opportunities. There was also a tendency to regret that previous opportunities for education and training before they had children had not been taken.

Those students with a previous professional career were more likely to see the study of technology as a way to enhance or extend their previous job prospects. For example one student although qualified in accountancy felt she would be unable to get a job unless she could develop some competence with new technology. Another wanted to return to

personnel work but be more involved with industrial management. The librarian wanted to become an industrial librarian. The student with management experience wanted to build on her knowledge of computing. One of the computer operators had begun learning Cobol but never finished because her family had moved house - she wanted to continue her computer studies. One of the chemists felt that she had a too narrow view of what was possible and wanted to view science and technology more widely.

Many of the students who had previously been teachers felt that since they left teaching that particular job market has both contracted and changed and that it was necessary for them to retrain in science and technology to come back at all. The two students who had been maths teachers were aware of the WISE year initiative and wanted to build on their maths qualifications to teach technology and industrially relevant material to girls in particular. Others felt that their old subjects - English, or PE were no longer open and they needed to retrain. One thought that it had always been a mistake to enter teaching and she wanted to move into industrial work. Two students wanted to move into teaching, one from a background of general office work, and one from previous work as a computer programmer. The latter wanted to get into teaching computer awareness and programming in an ITEC.

Those students who had some idea of the kind of new job or career they wanted saw the openings as existing in science and technology. They felt that the job market had changed due especially to the influence of new technology, and they were more frequently interested in pursuing electronics and computing subjects rather than general technology. For example one student who had been a clerk and felt that her previous job had almost disappeared because of the new technology, wanted to move into software. Another who had worked as a computer operator wanted a similar move. Some had informal experience of computing such as home micro use and felt they liked it and wanted more. At least one had done a short course (WEA) on computer awareness.

Although they were not involved in industrial work themselves, students appeared sensitive to what they perceived to be local opportunities, or lack of them. For example students near Peterborough, Livingstone and Newcastle Upon Tyne identified the dominant industries in their area and were trying to give themselves the sort of training which might fit them for jobs in those industries. Students from Devon and Derbyshire felt that there was so little

industry near them that they urgently needed skill training to give them a chance to apply for the few jobs that existed. Only one woman had thought seriously of developing a career working from home - and thought she could do technical writing or perhaps work for F International.

3.5 Financial Position

For three students their sole family income came from supplementary benefit plus child benefit (estimated by one student as leaving her with £43 per week cash in hand), a fourth depended on maintenance from her husband plus child benefit (giving her between £80 - £90 a week). For the rest, their husband's income was the primary income apart from odd periods of part-time and temporary work (such as script marking, bar work or market research) that they had. It can be seen from the information given above about when they stopped full-time work, that most students had been dependent on their husband's earnings for ten years. Of the students who were willing to state their husband's annual income, nine quoted incomes of less than £10,000, and four incomes of between £10,000 and £15,000.

Students with the lowest incomes could not have considered doing an OU course. One had applied in 1979 but never taken up the place when she worked out the fees. For these students there was simply no extra disposable income. They could not afford family luxuries like holidays. Most of the rest felt that they could not have justified their study as a priority. Extra money was used on things for the family and the children in particular. One saw her study as an "experiment" and so felt that it wasn't justifiable expense. Two remarked that once they were committed to doing T101 they would have tried to find the money, but that this meant using savings or a bank loan. In general the comment was that they would not have considered the course without the bursary.

The financial reality of families of 4+ persons on one income is that a system of priorities for expenditure must operate. Unfortunately the retraining needs of the non-working woman come a long way down the list, perhaps because the material benefits of the training appear so speculative and at some distance in the future. Despite the difficulties of balancing the family accounts all the women said

that their aim in working in the future was not primarily financial gain, but much more to do with job satisfaction. Any money they earned would go towards increasing the living standards of the family rather than providing a personal income for themselves, although a couple remarked that it would be "nice" to be able to buy some clothes without feeling guilty.

PART 2

THE EVALUATION OF COURSE COMPONENTS

AND STUDENT PROGRESS

CHAPTER IV DESCRIPTION OF THE EVALUATION

During 1985 data was collected from students from a variety of sources. The intention of the evaluation was to examine the various components of the first year of Option 1, to see how useful they were to students in their overall study during the year, and to suggest potential areas of improvement. It was also important to monitor the students closely, both in terms of their academic performance, and to discover whether any particular personal problems faced by this special group of students could be supported or anticipated in future years.

The sources of data were as follows:

- the bursary application forms which were completed by students and contained details of why they wanted to join the scheme, and a little bit about their personal histories
- a questionnaire asking for detailed information about the preparatory weekend at Loughborough, and completed by all students present
- an evaluator was present at the weekend and made observations which were combined with the questionnaire responses
- all students were interviewed by telephone during April 1985 to monitor their progress and opinions of the course at that point
- most students were interviewed face-to-face during their summer school, and the rest were contacted by phone
- after the exams in October all students were sent a questionnaire which as well as exploring further their opinions of the course asked how their ambitions had changed over the year and what their plans were for 1986
- the academic performance of students was monitored constantly during the year through regular computer printout of assessment grades
- during the year individual students made contact with various staff involved in the scheme, usually to discuss problems they were having with aspects of the course.

The following evaluation sections combine data from these different sources as appropriate.

CHAPTER V STUDENT PROGRESS THROUGHOUT THE YEAR

Once the OU study year starts in early February, WIT students' main teaching and counselling support comes from the local tutor-counsellor in the region. This backs up the home-based distance-learning system. For the purposes of evaluating and monitoring the WIT scheme, students were interviewed by telephone during the period mid-March - mid-April when the first TMA (tutor-marked assignment) and CMA (computer-marked assignment) are due.

5.1 A Question of Confidence

The first question asked was how they had responded to the first block of the course and the first items of continuous assessment. The most frequently mentioned reactions were:

cautious satisfaction at coping so far	14
concern at the amount of time required	6
coping now but some long-term apprehensions	4
finding maths difficult	5
finding maths very difficult	4
initial panic but coping	2

Two related issues which came up constantly were:

(a) the awareness of almost a complete lack of technological background, and

(b) uncertain confidence.

Typical comments were:

"I can answer the questions set for TMAs and CMAs, but I'm not sure whether I'm really understanding the block as a whole." (She got 89% for TMA01 and 100% for the CMA.)

"I can understand it while I'm actually working through the unit, but feel a bit flummoxed while I'm doing the CMAs." (She got 68% for the first.)

"My main problem so far has been the time factor. I have to put in lots of time to try and understand the basic concepts because I've got no background at all in this area." (She was a PE teacher. She got 85 and 85 on the first TMA and CMA.)

"I'm finding it very difficult because it's an enormous change and I have no background at all." (She was an English teacher.) "I've managed the calculations but I feel I don't really know what it means." (She got 100% on her first TMA but wondered if this was a mistake, or whether perhaps her tutor was just being kind.)

This last reaction was the most extreme example of lack of confidence. Most women who had had their results by the time of interview felt encouraged.

"I got 74 and 64 and feel really thrilled. It's a big morale boost." (She had been a shorthand-typist.)

"I hardly dared open the envelope, but when I did I found I'd got 82 and 80 so I was terribly pleased." (She had no technical qualifications, but had some work experience as a computer operator.)

"One of the other (male) students had been really patronising, but last week after I'd got my results," (89 and 100 after ten years at home. Before that she had been a technician at ICI.) "I stood up for myself. I'd proved I could participate on an equal footing."

Five women made particular reference to maths as a problem, though three had husbands who were able to help them. One other, who had been a maths teacher, was concerned not for herself but for others.

"It just isn't true that you don't need any previous maths. Quite a few in my group (including men) are having trouble, but if they had some really intensive help over a short period at the beginning, most would be fine. We've now got some self-help groups going and I'm going to do some remedial maths sessions."

Nevertheless only two students gained less than 60% on the first TMA (50 and 40) while half gained 80, 90 or 100.

The second contact period was at summer school when 23 of the 25 surviving students were interviewed face-to-face, and the remaining two by telephone. By then they were half way through the course and had completed at least three or four TMAs and five or six CMAs. The achievement of having successfully coped with three different themes (design of homes,

communications and energy generation and use with the required scientific tributaries) had reassured the majority and enabled them to settle into the course and enjoy it. Three and four women respectively had less than 60% on TMAs 02 and 03, with 71% gaining 8, 9 or 10. Some of their earlier misgivings and uncertainties still existed, but most women had learned to live with these -

"I'm doing well, though I don't really feel I've understood everything. I've come to terms with it a bit better."

"Haven't had as many problems as I expected, except for chemistry - very difficult. But I'm able to 'never mind'."

"No real problems. I'm enjoying it. I missed out one TMA and the last one was a bit disappointing but otherwise it's OK."

"Not too happy with my performance. It's just average."

In the light of subsequent results it would seem that the odd low grade need not in itself suggest future drop-out. One woman who got 4 for her third TMA, for instance, went on to achieve her course credit with consistently satisfactory subsequent results.

"I didn't realise it was bad when I sent it in, but now I know where I went wrong. My tutor was very helpful."

More significant perhaps are missed TMAs, especially when the student's confidence is still very frail. Three students missed either the second or third TMA, two of whom did not embark on a second course. The third had an incomplete continuous assessment record by the end of the year, though those assignments submitted were good, and she went on to make steady progress in her second year. Family problems had undoubtedly affected her first year of study.

5.2 Continuous Assessment Results

The award meeting to approve a second bursary was held in mid-October. At this time students have finished their continuous assessment and these results are known, but the final result for a course credit includes the examination result, and is announced in late December. MSC had agreed that awards for a second bursary for a higher level course could be based on success in continuous

assessment since this was sufficient evidence that a student could cope.

Of the thirty who began the course in February 1985, twenty-five had successfully completed continuous assessment, and were eligible for bursaries for 1986. Only twenty-four bursaries were however awarded. Sadly, one student who had achieved a quite outstanding continuous assessment record (all her CMAs over 90% with two 100%, and all TMAs over 80%) had been advised by her doctor to discontinue her studies for the present. She had heavy family responsibilities, and had worked extremely hard and conscientiously in an unfamiliar area of study because she needed to seek greater financial security.

Twenty-one students gained a full course credit at the year end (which could be used towards an OU degree), and three of these gained distinction. One further student narrowly failed her examination and has been offered a resit. The remaining two failed their examination - one is a single parent, had found a part-time job during the course, and did not have enough time to revise properly; the other felt she had coped with the course academically, and enjoyed it. But family events affected time available for study. Her father died during the year so her mother needed a lot of support. She herself was taken ill at the end of summer school and her revision had been badly affected by ill health. So she simply did what she could.

"I thought it was better to do that, than say if I couldn't do it perfectly I'd better withdraw. I'm looking forward to studying the computing course and feel very positive about it."

5.3 Family Responsibilities during the Year

The OU was designed for mature students to fit in with their other adult responsibilities. For the majority of women students these centre largely on the family - their husbands, children, parents and parents-in-law. Even when there are no major crises, many families are used to the near-total availability of the wife/mother. So it can be difficult to make a new start and establish the right to some private time and space without interruptions. Of the twenty-five who completed continuous assessment, three were single parents, two of whom had very supportive parents living locally, and anxious to help their

daughters improve their prospects. One of these women felt that it might be easier in some ways because she did not have to negotiate, or feel guilty about 'doing her own thing'.

Eight said their husbands were actively supportive, sharing household tasks and taking children away for the day when TMAs loomed. Five said their husbands 'didn't mind', but did nothing of practical help. One said her husband found it amusing and another's husband was continually telling her how disorganised she was. Children's reactions ranged from intense interest and pride in their mother's new activity, to becoming more demanding of attention - and loud groans whenever technology studies were mentioned.

A small number experienced major crises or set-backs, but nevertheless managed to complete the course successfully. Two students experienced close family bereavement. They coped not only with their own grief but needed to give support to the surviving relative. One student whose family lives overseas experienced continuing anxiety because of a violent and unstable political situation. One has a disabled parent and was responsible for intermittent care, and another has severely and chronically ill twins, needing occasional emergency hospitalisation. That these women succeeded in spite of abnormal demands on their time, attention and concentration is extremely creditable.

5.4 Changes to Students' Circumstances during the First Year

Apart from a few students who had crises during the year, the majority of students found that progress in studying with the OU was complemented by other aspects of personal progress, such as finding a job. But the 'regular' sort of family crises hit OU study badly, for example:

"Illnesses and husband's work commitments nearly led me to give up the course in June and July and I was unable to go to summer school. Hospitalised at the time of the exam and unfit at resit."

"Father died suddenly in August and I found it very difficult to continue my studies."

One student's marriage collapsed and the process of working out her future and arranging her divorce corresponded with the final long essay and the exam.

More positive changed circumstances were often connected to children beginning school or playgroup during the year, although because of the teachers' industrial action students were still responsible themselves for a lot of family childcare:

"Teachers' strike action has meant children are home from school more often. Son gets on average four (school) sessions a week."

Many of the students had applied for jobs, mostly without success but still undaunted, and at that stage still relying on their previous education and experience rather than their OU work, although it could impress interviewers:

"Applied for a temp teaching job, haven't had much joy - need to do a practical course in tech or craft. Have been accepted onto a Craft, Design and Technology course, interviewer impressed by me doing T101."

"They needed trained programmers or ex-graduates so I'll just have to be persistent."

"Mostly sales jobs selling high tech equipment. I seem to be too old and do not have the right qualifications but I keep trying."

"Applied for technician in pharmaceutical lab, and part-time teaching. Wasn't short listed for either."

Of those who had got jobs during the first year two were supply teaching and one was part-time teaching. One was doing word processor training from home, one was working as a VDU operator part-time, and one had a temporary job as a computer operator.

5.5 Plans for 1986

(a) Course Plans

The following is a list of courses for which students received bursaries in 1986:

TM222	The digital computer	8
M252	Computing and computers	6
PT502	Microprocessors and product design	3
T281	Basic physical science for technology	2
T244	Managing in organisations	2
T283	Introductory electronics	1
TM282	Modelling with mathematics: an introduction	1

Two students took a second course that they were paying for themselves because it was a course, for example the Mathematics foundation course, which was not eligible for a bursary. This seems to reflect a commitment to working towards a degree on the part of these students.

The students were obliged to be more directive in their choice of second course since second level courses are more specialised. The two main directions chosen were:

(i) to take courses to improve their maths, in particular TM282, although one student registered for M101, the Mathematics foundation course, which she paid for herself.

(ii) courses about computers, M252 and TM222, because many students felt that this was the best direction for a future job. They were also tempted because they knew that they would get a priority place. Ordinary undergraduate students have to join a long waiting list for these courses.

(b) Personal Changes

Very few students anticipated major changes in their lives during 1986. Those who did were concerned with moving house, or their husband changing his job. One was expecting a baby in the summer. However for most students 1986 was anticipated as being a smoother year. They were by then used to OU study so they had some confidence about what to expect, although they realised that a second level course was more demanding. Also children were getting older, beginning school in some cases, or becoming generally more responsible for themselves.

(c) Changes in Long-Term Career Plans

There were no obvious changes in career plans among the students. Most were still pursuing the general notions, mostly about work with new technology that they had when they began the scheme. What they had been doing during 1985 could perhaps be described as orienting themselves towards study in general and technological subjects in particular.

CHAPTER VI THE PREPARATORY WEEKEND

6.1 Aims of the Weekend

- to consider the skills required to study engineering and related subjects and work in this field and to identify weaknesses in knowledge or skills
- to identify possible future job opportunities in engineering or related careers
- to appreciate the problems faced by women returning to work in this field and to identify strategies to deal with problems
- to develop a personal plan for future activities leading into technological careers
- to plan a programme of studies through the Open University and to prepare for the return to study.

6.2 Description of Activities

The weekend is held at Loughborough University of Technology Centre for Extension Studies. In 1985 it was held between 11th-13th January, a period of severe winter weather which resulted in a number of students having to leave earlier than they had planned on Sunday morning.

Twenty-eight students attended the weekend, along with four women tutors who were present or former T101 tutor-counsellors, the organisers Sue Cox (from the Centre for Extension Studies), Ailsa Swarbrick and the evaluator Gill Kirkup. Most students arrived between 4.30-6.30 on Friday evening and left about lunch-time on Sunday. The activities for the times in between were as follows:

Friday 11th January

4.30 - 6.30	Reception for course members at David Collett Hall. Allocation to accommodation in local hotels or David Collett Hall	
6.30 - 7.30	Evening meal (buffet) in David Collett Hall	
7.30 - 8.00	Introduction to the WIT study programme and the preparatory course: introduction of group leaders	Sue Cox
8.00 - 9.00	Videos	
9.00 - 9.45	Small group discussions with group leaders on 'Why Technology?'	

Saturday 12th January

9.00 -10.30	Introduction to T101: its rationale and content; followed by discussion	Geoff Chivers, CES Group Leaders
10.30 -10.45	Coffee	
10.45 -12.45	Maths tutorials, in groups, doing T101 maths	Group Leaders
1.00 - 2.00	Lunch	
2.00 - 3.15	Practical session - A new perspective on domestic technology	Gill Kirkup, Lecturer IET OU
3.30 - 4.15	Tea	
4.15 - 5.30	A new perspective on domestic technology continued	
6.00 - 7.00	Dinner	
7.30 - 8.00	Returning to study with the Open University	Ailsa Swarbrick, Coordinator WIT and Senior Counsellor OU
8.00 - 8.45	Panel discussion: problems and their resolution	
8.45 -10.30	Wine and nibble party. Display of materials and individual counselling by arrangement	

Sunday 13th January

9.00 -10.30	Management of time/learning	Sue Cox
10.30 -10.45	Coffee	
10.45 -12.45	Future course choice and career development (in groups, or with panel of group leaders, or by one or two group leaders/staff tutors)	Geoff Chivers
1.00 - 2.00	Lunch	
2.00 - 2.30	Course review, final questions and close	

Opinions about the weekend were collected from students by questionnaire completed at the end of the weekend and returned later, and by eliciting opinions from students in other interviews during the year. A detailed evaluation was produced soon after the weekend. It dealt with each activity separately and suggested areas for improvements, only the important aspects of which are reported here. Overall the weekend was, for the students, possibly the most successful part of the year. As well as the very positive comments elicited in response to the questionnaire (and quoted later), students often remarked quite spontaneously during later interviews on how much they had enjoyed the weekend. They also regretted that there could not be another weekend at the end of T101 or at the beginning of their new course. (A short weekend was provided in April of the second year to cover career development.) Some students unfortunately felt very isolated during the rest of the year. The main areas where students felt that the weekend could be improved were advice on future careers and course choice. There was also the problem that many students had not received a first mailing of course material, and the absence especially of maths material meant that they were anxious about what to expect. The following sections deal with particular important issues.

6.3 Aims and Expectations of the Weekend

Students did not appear to have read very closely the information given to them about the weekend. Four reported that they did not realise that the preparatory weekend was an essential part of the bursary programme. Some did not remember being told anything about the aims of the weekend. They guessed that it was there as an introduction to study primarily, and as an introduction to T101. However, they brought to the weekend a wide range of personal needs that they hoped could be dealt with.

help with organising study	5
advice about standard and amount of work necessary	3
boost confidence	5
advice about T101	4
chance to talk to others in the same situation	3
reassurance over maths	2
where the course might lead	2
how to use the qualification gained	
career suggestions	

6.4 The Programme

On the Friday evening students were put into four groups each led by a tutor, which stayed together throughout the weekend. Students liked this. They liked the continuity, and the group identity, and felt that it increased their own confidence and made it easier to talk. Later they were shown two videos about young women graduates making careers in technology. Comments about the videos and the discussion around them indicate that they weren't very useful, although students made a great deal of effort to find relevance or at least positive simulation from them. Since then the OU's own video produced for WISE year and showing mature women who have made a fresh start and studied technology successfully in the OU has been used instead.

What the students said about the videos not representing women that they could identify with, has been taken seriously by the WIT scheme and the Technology faculty of the OU. Careers material for mature women who want to retrain in technology has now been produced in the form of a booklet called 'Career-Wise'. This has been funded jointly by the

Technology faculty of the Open University and the Equal Opportunities Commission. It is available, free, from the faculty.

The following are the sort of comments women made:

"All the women didn't appear to have any encumbrances (eg husbands, children, pets etc) to organise before starting work. This is the bit that bothers me about any sort of paid work! Their actual professions were interesting but why were the majority so young?"

"Showed the real possibility of more women in technology, where one might get to (or wouldn't want to). However felt it unlikely that many of us would get into any of the jobs described."

"Interesting but didn't identify at all."

"Too good to be true - didn't show the hard graft involved getting there."

"At least it was an illustration of being positive and motivated towards what you personally want to achieve."

"Women involved were too young, glamorous and successful - difficult for me to identify with."

On Saturday morning students were first given an introduction to the course followed by tutorials in maths, and for those competent in maths, a tutorial in chemistry. The issue of confidence and competence in maths is something which worries the majority of students all the way through the course. Attempts to deal with it begin here, and unfortunately very few students had seen the maths course material before the weekend. This meant that what could be achieved by the tutorials was limited as the following comments indicate.

"If we'd had our course materials, it would have been better, but I found it encouraging that I could cope, though admittedly with the elementary stuff."

"Had already begun to identify my problems. However it would have been better if others had had it (?course material?) to extend what we were able to achieve."

"Perhaps I was in the wrong group. Having taught maths to 11-12 year olds I found fractions and simple algebra boring. Would have loved to escape into a corner and have a go at a numeracy book."

"Our group was given sheets to work through in groups of two or three. Self help was the order of the day (with guidance if necessary) and worked very well."

Those students who had done chemistry instead of numeracy were very satisfied, although at least one wondered if she should have been helping with the numeracy groups.

"Chemistry interesting - would perhaps have been better occupied helping group leaders with maths tutorial. Some of the more able course members felt they got a raw deal here as the group leaders were bogged down with the ones that were very worried."

The Saturday afternoon session was designed to relax and entertain students, and to get them interacting together to explore a particularly 'female' area of technology - the technology of housework. In the main it was enjoyed, but a few students who wanted a more academic or T101 orientated session found it "low key" or "only moderately useful".

On Saturday evening there was a discussion of the workings of the OU system, followed by a question and answer panel session. Although most students felt that the discussion of the OU system was satisfactory, there were some complaints that it was too short especially for those who had not received the course material. There were a number of criticisms of the panel session, to do with its organisation and the best way to elicit questions:

"At that stage we were so inundated with information that it was difficult to sort out specific study problems etc. Perhaps we should have been given time (5 minutes) to write down questions for panel sessions and individual counselling sessions."

"Planned questions - ie asking the groups or individuals to ask a question might have generated more panel discussion."

"Socially the session was one of the highlights - absolutely hilarious - but I don't think it helped."

This was also a time when students could have individual counselling sessions. Those who had were very happy with them, eg

"Yes - all counsellors/staff tutors helpful, approachable and positive."

"My individual counselling session was very good and my questions were fully answered. If anything I wish that I'd prepared my thoughts for it more fully."

"Too informal."

However, some students deliberately opted out or weren't sure how to get a personal session arranged:

"No somehow I missed out on individual counselling. I think some students tended to hog most of the tutors' time."

"Opted out - I wasn't sure how to make arrangements - also like sessions to be private."

"Insufficient time allowed for counsellors to make contact with all of the group."

On Sunday morning students had a session on how to organise and manage their time. This was very successful and students made lots of comments about its personal relevance to them:

"This has helped me to work out the best available time for my study."

"The management of time theme was present throughout the weekend course and this session helped to consolidate it and emphasise its importance for our future studies."

"Very useful in helping us look at our own situation and devise our own schedules rather than generalisations and idealised situations."

"Having done the time log exercise I had begun to see where study would most probably best be fitted in, but discussing how I was using my time with someone else and ways of saving time, gave me help in seeing where I might gain more study time where I'd not considered finding it."

This was followed by a discussion about future course choice and careers. Students felt they would have liked more of this all through the weekend. Comments on this session were very enthusiastic:

"Excellent - worth attending the course for this alone."

"Much more realistic than the earlier video."

"A bit vague, would have liked some specific case histories of WIT etc."

"Having the confidence to follow the advice will be my problem."

"Not enough on future course choice."

"Wondered how much study after T101 would be required to break into some of the careers mentioned."

There was a literature display during the weekend and when students were asked for suggestions for further material to be included in the display, they requested careers material and course advice.

6.5 Overall Assessment and General Comments

The comments given to questions in these categories reinforce what those of us present at the preparatory weekend felt about its success. Students enjoyed the organisation, food and social life, were interested by the content of sessions and went home feeling enthusiastic to begin the work, with their confidence boosted. Suggestions for change are usually for minor improvements.

The living accommodation and food were considered excellent, the only complaints were that there was "too much to eat" and "heating occasionally excessive".

Most students remarked on the psychological and social benefits of the weekend.

"It wasn't what I expected but it provided a great deal of encouragement and was a terrific confidence booster. I also feel that I would not like to let any of the organisers down. I would very much like to succeed."

"Felt encouraged and extremely stimulated and want to go back and get stuck in."

"The weekend provided me with a feeling of support. I felt part of something exciting."

"(Just getting there) I may be particularly pathetic, but I found that arriving at the right place at the right time and coping happily with the weekend independently gave me a great deal of personal confidence that has affected positively my attitude to the actual course work ahead."

"I needed to identify with others and reassure myself."

"Well organised yet flexible enough to change timings when necessary."

"I would have liked the individual tuition on essay writing and maths which I missed out on."

Suggestions for improvements fell into the following rough categories (a) advice on course work and how to do it, (b) more on future course choice and careers, (c) modifications to the organisation, (d) social events. These were minor.

A preparatory weekend appears to be vital for students studying in this way. It served many different functions, eg it signalled a 'real' beginning to the programme of study, it gave a sense of being part of a group with common aims and problems. For some women it was the first time in years they had been away from their husbands and children for a weekend. They had a chance, they felt, to be treated as individuals in their own right, rather than like wives and mothers. All students would have liked more such weekends during the programme, and would have attended them enthusiastically. (See 6.2)

In fact because so many students during the year mentioned how much they would like, even felt the need for, another group meeting, a short weekend meeting was arranged for April and sixteen students attended. For six Scottish students a full day meeting was held in the OU's Glasgow Centre.

Only a few students lived close to other WIT women. Those who did kept in contact throughout the year even arranging to go to summer school. One described the friendships begun at the weekend as permanent.

"It was quite an experience that weekend in Loughborough - meeting so many women of like mind. I've made two permanent friendships and it helps to know that there's somebody else going through the same things."

Even when the contact with other students was brief it was useful:

"I kept in touch briefly with one and found it was reassuring to realise that someone was experiencing similar difficulties to me."

More reserved students felt that one weekend was too brief an encounter to use to build a friendship.

"We only met for a weekend and I think that unless you know a person quite well, long-range contacts (I'm in Northumberland) tend to peter out."

Overall for almost all the students the weekend had a much greater impact on their confidence and motivation than they had expected. One described her feelings as follows:

"The weekend at Loughborough made a particular and unexpected impact on me. When I applied for the supply teaching I felt I was doing it for the group. Similarly when I found the work difficult at the start, I felt I couldn't give up or it would let the girls down."

CHAPTER VII THE SUMMER SCHOOL

7.1 Relationship of the Summer School to the Course

An integral part of the Technology foundation course is the week's residential summer school. Students can choose from four sites (conventional campus universities at York, Norwich, Warwick and Bath) and from a nine week period. In any week there may be up to two hundred T101 students who are allocated to tutor groups of thirty approximately. These groups also circulate round different activities or projects each day run by another, specialist, tutor. The school is heavily male-dominated, with over 80% of students men, few or no women tutors, and invariably a male course director. Earlier research, and experience of staff working at summer school, suggested that many women find such an environment intimidating. So early in the year, all the students had been circulated from the WIT office with a grid of summer school weeks when staff connected with the project would be on duty as counsellor/tutor/course director. The aim was to encourage the WIT students to attend in groups when an informed and sympathetic member of staff would be present. Obviously there are other constraints on choice of week, but there were only two students who were obliged to attend when there were no other WIT staff or students. The others found it extremely helpful, especially at the beginning, to have some group support in what can seem a threatening situation, as the following comments illustrate:

"It's nice to be part of a little group. I arranged to come with another WIT - I'd have found it intimidating if I'd been on my own. It was reassuring to know at least one other woman I knew would be here."

"It definitely helped meeting other WITs on the train, and made such a difference knowing some of the others and Lynette (Assistant Project Coordinator) would be there. And I think that us being a group made it easier for other women here too."

"I felt OK right from the start - because the other two were here."

It seems well worth making such arrangements which build on the group solidarity established at Loughborough. Nineteen of the students' reactions

were mainly enthusiastic; they felt summer school was both enjoyable and useful, even though six reported feeling very apprehensive beforehand. The others felt it was mainly satisfactory but had some reservations. Five thought the programme was too intensive and very tiring, while three felt rather inadequate in practicals. In general students had found summer school most useful in providing revision help; enabling them to catch up (especially on time lost because of children's school holidays); in taking part in practical work:

"I liked seeing the results of what I've done even if I haven't quite understood it all."

and because it provided a fresh boost to motivation - "like the Loughborough weekend" as one put it.

7.2 Domestic Arrangements

It requires a substantial feat of planning and organisation for most women with families to attend summer school. The Loughborough weekend had given some practice in this although on a shorter time-scale, but it is clear that responsibility for ensuring all continues to function smoothly at home still lies primarily with the woman.

Family care had been delegated to:

husband	10
mother or mother-in-law	7
combination of above	4
children's camp	3

Some sample comments were:

"My husband's coping - mentally if not physically. I did a big clean, filled the freezer with food."

"My mother's got the kids. My husband was supposed to be working, but isn't, but he didn't want the responsibility anyway. I had to take them to her first, that's all" (a trip of several hundred miles).

"Mine are old enough to look after themselves - 17 and 15. Husband's home in the evenings."

"The two oldest are with my mother-in-law. The youngest is staying at home - a shared responsibility between husband and friends. I just made sure there were clean clothes, packed cases, but didn't get in food."

"Quite a bit of organisation. My mother has taken a week off work."

"Had to get everything ready - washing, ironing, shopping, paid bills - then they're on their own."

"Husband has week off. Booked in March so I could come. Left detailed instructions because of the twins (chronically ill)."

Four women felt worried about how their families were coping, two felt guilty about leaving them for a week, four mentioned missing their families and fifteen simply telephoned regularly and then put it out of their minds.

7.3 Sexist Attitudes and Harrassment

A technology summer school provides conditions in which sexist attitudes and harrassment can take place - a majority of men assembled to work in a traditionally male area of knowledge where virtually all power is in male hands (tutors). When sexism is allowed to develop it poses a threat to individual liberty and autonomy to learn and should be seen as such. The faculty has a responsibility to make it clear that sexist behaviour will not be tolerated. This is particularly relevant now since the faculty is currently attempting to encourage more women to study technology.

Five students went into some detail about their perception of this problem, though several others made wry passing references, eg

"you should interview the men - they're the ones with the hang-ups."

It should be noted that these five had enjoyed summer school both academically and socially apart from this, but it had been a factor they resented because it interfered with work and also because they found it upsetting.

"Socially it's OK now, but the women students in my group got really fed up at first with the stupid sexist talk from some of the men. So we stuck together and then some

of the other men students took our part and then it stopped. Now I feel much more confident - I actually left my partner in this morning's experiment because he insisted on doing it all while I watched. I just went and asked my tutor if I could change with another and it was OK."

This student commented particularly on the (for her) most interesting and enjoyable session (the water quality trip). She felt the friendly, relaxed but industrious atmosphere was in large measure due to the woman tutor.

This experience was very similar to another WIT's, where the five women (of thirty) students were able to combat verbal sexual harrassment with the support of other men.

A third referred to a persistent low-level vein of verbal harrassment by tutors and students.

"Tutors seem unaware of it, don't appreciate the struggles women have to study technology at all. Some tutors won't let women work together in the labs, we have to pair up with men. I think this needs to be handled sensitively and flexibly - sometimes it works, sometimes not, depending on the individuals."

Two students who had arranged to attend together and were otherwise gaining much from the week spent a long time with the interviewer. They were experiencing real problems with a particular tutor whose behaviour they regarded as crude and objectionable. These students were using male students as protection and missed the supportive presence of their husbands. The interviewer discussed the matter with the course director who was concerned but unsure of the best action to take.

CHAPTER VIII TUTORIAL PROVISION

For their face to face tutoring during the year WIT students are assigned to a tutor according to where they live, in the same way that any OU student is assigned. Attempts were made through each regional office to inform the tutors with WIT students that they had such special bursary students. However the message did not always get through, and many students felt that tutors did not know anything about the scheme or that they were bursary students.*

Students form opinions about their tutor and the quality of the tutorials very early in the course. Some students never set up a pattern of attendance and this was unconnected to their opinion about their tutor but due to other factors which we will discuss later. Those students who liked their tutor became regular attenders and were most likely to keep this up, whereas students who had one or two experiences at tutorials that they thought were time wasting stopped attending early in the year. Students have to believe strongly in the benefits they are getting from their tutorials to organise their families and travel long distances to attend.

Unfortunately tutorial provision both in terms of the teaching students received on their written work and the quality of the teaching they received at their weekly tutorials was the aspect of the course which received most criticism from students. It was a minority of students who described their tutor as helpful and friendly, without reservation. These students described their tutors as approachable. One described her tutor as "bouncing off ideas" which she liked, but then that same student found the small group of students (only three others turned up) not very friendly and she didn't get the social contact, or the drink in the bar that she hoped for afterwards. Some students attended the tutorials as much to make social contact as to learn, and where these contacts occurred students became enthusiastic about the tutorials. Some tutors were obviously able to encourage a supportive atmosphere but others were accused by students of being too formal in their teaching and therefore inhibiting a social group from forming.

Many students gave organisational reasons for not attending tutorials. Two had husbands who worked late, often without warning, so making it impossible for the students to get a baby sitter at late notice. Another felt her children's activities had to come first so she had to see to them instead of attending her tutorial. Another was a single

*A special leaflet for regional staff to raise awareness of key project issues and student needs has now been produced.

parent and felt she could not afford a baby sitter. It was also obvious from some of the students' comments that they were travelling to the study centre using public transport. This could entail long journeys up to two hours both ways, or inconvenient journeys necessitating changing buses. In one case the late return journey was almost impossible because so few late night buses ran. What none of the students complained about was feeling nervous about travelling alone on public transport late at night. However it is safe to assume that at least a few are indeed nervous.

The sorts of practical issues described above are not special to students on the WIT scheme, but are likely to be problems for many women students. Whether or not they are problems that it is possible for the student to surmount will depend both on the individual's practical circumstances and her level of motivation to attend the tutorials. We suspect that some students found the whole notion of attending a group meeting with strangers who they presumed knew more than them, intimidating. Such students would be easily put off by practical difficulties. We are presuming this because a few students who did attend spoke in our interview with them of their nervousness.

One student felt she had a very good tutor. He knew about the scheme, she was the first WIT student he had taught and he was very keen to help. In spite of this she felt embarrassed about ringing him or bothering him at tutorials because often she did not have specific queries, she was in need more of a general talk, and she didn't think that this was legitimate. Another didn't like to ask too many questions in case she was holding everyone else up. Another felt similarly although she was sometimes out of her depth, and feeling slow compared to the rest of the tutor group. Although tutors may be aware of the special needs of bursary students in terms of their lack of experience or confidence in the area, it is unreasonable to expect them to concentrate on the needs of WIT students to the detriment of other members of their group who may have other different needs.

As a result of these findings, the amount of telephone monitoring, advice and support from one of the Project's women technologists was sharply increased during 1986. This meant she was able to pick up potential study difficulties during the course of a general discussion on progress, and where necessary make direct contact with the home region, alerting the tutor-counsellor to initiate help.

It is interesting that the preparatory weekend at Loughborough did not raise similar anxieties in the students. Instead the fact that they were all women beginning the scheme, who had a similar recent history of being out of paid employment and looking after children, overcame any differences of social class or educational level. The interactions at the weekend were then seen as supportive and confidence building. Perhaps there is a general need for women beginning study in the technology faculty at the OU to attend support meetings.

However, the most disturbing thing about the comments students made about their tutors was the amount of dissatisfaction they reported. A few were reporting vague dissatisfaction in their first interview in April, but a large number were very detailed about their dissatisfaction in the questionnaire they completed at the end of the course. What follows here are the most explicit comments.

Students were most critical of the poor quality of the teaching occurring in tutorials:

"Tutorials unstructured and not very helpful. Tutor easily sidetracked and spent too much time on a specific question rather than the principles of the subject."

"My tutor explained that it was not his job to teach. Clarification of aspects eg enthalpy could not be accomplished because he did not know the answers. Tutoring was minimal but company of fellow students invaluable."

"I taught an evening class on my tutorial evenings so unfortunately I could attend only four. The first tutorial was satisfactory and my tutor was particularly kind to and concerned about me. He was interested in WIT. The second tutorial I arrived late (bus) and he left early and didn't seem thoroughly prepared. The third tutorial was taken by a substitute tutor who was very good. On the fourth tutorial, my tutor brought the materials and was totally unprepared. We discussed the long essay, but he hadn't even read the essay questions. I was annoyed. If I'd struggled to pay for the course I'd have been furious but perhaps the tutorials I missed were excellent."

Some students felt that the tutor was not interested in their special needs as women new to the area:

"Tuition could have been better for me but it was difficult for the tutor as many of the male students dominated his time . . . I tended to switch off and come home more confused and depressed."

"The tutoring was not adequately orientated towards a non-technical student viz those on the WIT course. We did try to organise extra tuition but it just never happened. The tutors were geared towards the men with technical expertise."

"I was in a group where the majority of us were women. (I was the only one with the WIT scheme.) Our tutor seemed to be slightly biased towards the men, she also assumed that 'us girls' would have trouble with maths."

"PATHETIC. I had no support for TMAs. My impression was that women should not be studying this subject. I tried extremely hard to get some communication going and in the end I gave up. I felt he marked my TMAs lower because I was a woman. At the tutorials, nearly every time he asked me first if it was all clear. To counter this I made sure that I answered his questions

before the men had any chance to. It was extremely annoying his attitude but made me more determined. He was extremely helpful on the block essay to all of us. His opinion of me changed I felt during the last tutorials. He went through old exam questions which lucky for me I was capable of answering. He was surprised as he made the comment 'It sounds as if you will sail through the exam'. From then his attitude seemed to change, possibly because I was close to finishing the course!!"

Not surprisingly given the family responsibilities of the students some found they weren't able to attend often.

"To get to my study in S... for 7.00 I have to leave home at 5.30 and do not get back home until 10.30. I often felt that my time would have been better spent working at home. Two or three times I telephoned my tutor for advice and found this much more helpful than the tutorials."

When these difficulties were compounded by poor tutoring students got a rough deal.

"I didn't think very much of the tutorials at B... I didn't attend many, mainly because the organisation of the family to attend; the fact I had to leave early to catch a bus or spend about ½ of an hour on a bus station if I stayed till 9.00pm; the tutorial content was a mystery till I got there - we were working to a timetable that had been handed out to most of the others but repeated requests for one didn't produce a copy so that those I did attend I possibly had not read that far, so any queries that would have arisen could not be aired, so they weren't as helpful as they could have been. All this and the fact I had a ready-made self-help group in my husband who had taken T101 in 1984 made it a better use of time to study at home. I had better counselling concerning the future from my husband's tutor-counsellor who I also knew from my tech. days at John Dalton College in M... Summer school tutorials were a great help."

What these comments indicate is that some technology tutors are not skilled at teaching students who come from a non-technical background especially if those students are women. Perhaps a case can be made to provide some extra training for foundation course tutors, who are obviously interested in teaching at the foundation level, and could therefore be presumed to be motivated to improve their skills. This is especially important if more women register for the foundation course.

Further almost all the students had male tutor-counsellors. It does seem that more effort could be made by the Faculty to appoint women tutor-counsellors. This would offer positive role-models for women students and also help to make the image of male power structure less monolithic.

CHAPTER IX STUDENTS' OPINIONS OF COURSE MATERIAL AND DISTANCE TEACHING IN GENERAL

9.1 The Course Overall

Students felt that T101 was a good course to begin their studies with. The majority had only general notions when they applied about where their interests might lie or what particular aspect of technology they might like to get work in. They felt that the breadth of the course had made accessible to them areas of technology they knew nothing about before, as well as helping them see what aspects interested them and what aspects they would not wish to pursue further. The following comments are representative:

"I had no clear idea prior to this course of what the word 'technology' really meant. I saw it as the practical application of a science, but did not appreciate there could be such different points of view."

"Since completing the course, I have found that I am now interested in all sorts of topics I previously thought boring, nothing to do with me, or beyond my scope . . . The other week I found myself thoroughly absorbed in a TV programme about the future of farming."

"Different blocks have opened up various options that I want to pursue - alternatively has shown me what areas don't interest me."

"It made me very aware of how large a part technology plays in our everyday lives - many think of computing only as I did before!"

Those who expressed disappointment in the course felt that it wasn't technical enough or difficult enough.

"More of a social science course, and a technology foundation course with more maths and science would have been more appropriate."

"I felt at times that the material was over simplistic and laboriously long, though I imagine it is excellent for people not used to studying."

The attitude that the course was too simple was a minority one. Students were aware of the way the material, and in particular the numeracy, was designed

for people with no background in the area. At the beginning of the course maths was an area of great concern to most students, and although it remained a concern for a few when the course was finished, for others their confidence had been boosted:

"I liked the way (T101) assumes that you know absolutely nothing and starts at the basic level especially numeracy. I thoroughly enjoyed the maths and found it easy. I found the chemistry most interesting as I had never done any before." (Student with O levels in arts and languages.)

"Initially I was anxious when glancing through the Blocks as they appeared to be on subjects I knew nothing of. However, I felt the Blocks were well related to one another, were very interesting and made me think much more about technological problems. I thoroughly enjoyed the maths and the challenge of tackling scientific problems." (Student with BA English.)

"The maths I coped with better than I thought." (Student with O level maths.)

As well as maths, chemistry was a subject many students found difficult. The other units students remarked on were the same as those which other evaluations have highlighted: 'Energy', 'Resources', some of 'Communications' and 'Structures and Materials'. Making sense of formulae and remembering terminology were the major problems in these units.

Despite backgrounds in arts subjects, some students had little confidence in their ability to write. They found doing the assignments hard work:

"It was not easy but it was a good discipline to have to tackle the TMAs, to have to sort out what the Block was really all about to answer a question and put pen to paper and say so. Essay writing I still do not find easy."

9.2 Broadcast TV and Radio

Only students who had video and audio recording facilities found no difficulty viewing TV programmes or listening to radio. The rest found that the effect of the early hour on their capacity to think as well as the demands of young children early in the morning made it almost impossible to watch or listen.

"I often overslept and missed TV broadcasts."

"I started off conscientiously hearing/watching the programmes on my own set but found the early start too much. From about May onwards obtained cassette from the OU office in Edinburgh and the audio department at Walton Hall."

"We don't have a video so I couldn't record the TV programmes and I found the timing most inconvenient. I would get up and begin watching on my own then the children (2 and 4) would arrive to 'help'. In the end I gave up trying."

"Radio - too early in the morning, although I was up and dressed the children's demands for breakfast etc made it impractical for me to listen."

"I am not at my brightest or most receptive at 7.00 in the morning."

Only one student felt that the early broadcast time was an advantage:

"It was the only time of day I could guarantee absolute peace and quiet!!"

One student remarked that she hadn't been told that a colour TV was essential:

"We have only a portable black and white TV. For chemistry colour TV was assumed yet I don't think this was mentioned anywhere."

9.3 How Well does Home Based Study fit in with Family Life?

For most of these women home based study was the only possible form of study open to them because of their family commitments. Even those students with children at school found that their free time was cut into by children returning for lunch and the early return in the afternoon of primary school children. Travelling to educational institutions for more regular forms of study would have been very difficult. For students who managed to organise a regular routine home based study worked well:

"I did most of my studying during the three mornings that my daughter attends playgroup. I found the nine hours a week was ample most of the time but when an assignment was due and at exam time I did extra work in the evenings. I don't think my study affected the family much at all."

"Fits in well but hard to find long uninterrupted periods."

The special problem that these women had was that if their study too obviously took up their time and energy then the other members of the family resented it. It might perhaps have been easier for these women if they could have attended an institution to study since that would have made a clear separation between their family and their study. Often they studied at times when the rest of the family weren't around, because this made their studying invisible. In these situations the amount of support given by a partner was very important.

"(Family) fairly relaxed about it although I try to do it at times it won't interfere with their lives."

"I tried as much as possible to do my work during the day so that the evenings were free for them, but that didn't always work. In the beginning they found it difficult not to bother me when working in evenings but gradually they recognised that it was far better to bother their father."

"It's tolerated. In theory my husband is keen to encourage me, and is aware of the time and effort involved . . . in practise he doesn't help (with children and house) as much as he said he would."

"The youngest child resented the lack of time I sometimes had for her. I'm glad I was able to soft pedal with my own studies when the elder girl was sitting her O levels."

"I've neglected the housework dreadfully at times. I felt guilty about this. Also I don't like the place in a mess. My children were a bit jealous that I had an outside interest. My husband was very supportive - taking kids out to give me time on my own - but I sensed that maybe he felt slightly threatened that I was invading his territory."

9.4 The Advantages and Disadvantages of Distance Learning

The main two advantages were seen to be the facility to study at home and the flexibility to choose when to study. However this flexibility did not mean that students were studying at their own pace and some felt very tightly scheduled:

"I never felt I was studying at my own pace, it was always a battle against the clock."

"To my surprise I found that I worked best under pressure like leaving TMAs and set essay until last minute then working solidly through the night."

"Good days would do a fair bit, compensating for those disorganised days."

Although most students felt that they could have considered only home based study because of their family responsibilities there were practical disadvantages of studying at home; for example the demands of the children or the absence of anywhere to 'escape' to.

"We have a small cottage on one level so home based study although attractive to me was difficult to achieve except when all children were in bed. So occasionally I escaped to local university library."

"No help with children 2 and 4. Study around them snatching time. I did almost give up but was remotivated after a phone call with a WIT member."

"(Difficult) trying to fit it all in when the family were out. Towards the end of the course we'd all managed to work out a good routine."

"I couldn't do anything at weekends or school holidays."

"Children often ill."

In fact combining study and domestic responsibilities was noted most often as the greatest drawback of home study. Students also felt that lack of contact with other students and their tutor made it harder to keep motivated.

"Lack of tutoring made me feel insecure but more self-reliant. Difficult to be motivated unless I had a deadline to meet."

"I found studying a very isolating experience. Apart from my husband there was no one to talk it over with. Lack of feedback with CMA."

"I would have phoned my tutor but I hate talking on the phone."

"With lack of contact I kept thinking I was doing worse than I discovered I actually was."

Unfortunately distance teaching has disadvantages for students who are already in a socially isolated position.

CHAPTER X CASE STUDIES

10.1 Successful Case Studies

Morag enquired about the WIT scheme having seen an advertisement in the Executive Post. This first letter made it quite clear that she was keen to return to work as soon as possible but with the possibility of achieving a high-level, recognised qualification in science or technology at the same time. Her first qualification had been in drama and after seven years' experience as a stage manager she had been obliged to take an extended career break to look after elderly relatives. When finally she was free to resume her career she had found it impossible to find new openings in the theatre world and had settled for a temporary part-time unskilled job to boost the family income while her husband attempted to establish a small business.

In her application she wrote:

"I plan for a full degree in technology - relating to electronics. I would also like to take Microprocessors and product design as I will need all the experience I can gain to go and compete against men and the young people who have grown up with the new technology. But I intend to return to the full-time work force as soon as possible to play my full share in the new technology industries, creating a new career for myself but also to help in some small way to contribute to the success of the British electronics industry."

She found the Loughborough weekend was crucial in developing confidence; making her aware there were other women in the same position; and knowing the support of the project staff. By summer school she felt she was coping with her new studies and was satisfied with her continuous assessment results, although she had found she needed to spend more than twenty hours a week on the course, not the average of fifteen suggested. Morag lives in a small country town and at first felt insecure at the lack of contact (study centre was a fifty mile round trip). Later she made friends with another woman student and with mutual encouragement felt they both became more self-reliant. By the time she completed the Technology foundation course successfully she had begun applying for jobs selling technological equipment. Her success led her to believe she could cope with part-time study and a job, and she was keen to "test the water" and acquire some recent working experience.

By the March of her second year when she was studying Microprocessors and product design she had been appointed as the only woman in a team of sales representatives of a construction firm. At the day school on career development she urged the other women not to be discouraged at rejections (she had had over thirty!) but just to keep on applying and learn from the interview experience.

Carol's previous educational qualifications of two O levels in English and maths would not have given her entrance into a conventional university, and her eleven years' working experience had been mainly as a clerk, with a little on an offset-litho printer. She had been at home for five years with her two young children, but had begun to look ahead to the time when her youngest ($2\frac{1}{2}$) would start school and leave her more able to re-enter paid employment. Her aim was both to further her education and to gain knowledge of computing.

By the end of March she had got over her feelings of initial panic and had succeeded in setting up a routine of regular study. Both her husband and her tutor-counsellor were supportive and encouraging. Her husband made sure he was home in time for her to attend all the study centre sessions, helped a bit with her first computer marked assignment, and took the children out while she did her first big assignment. Although she was the only woman in her T101 tutor group and had felt rather out of her depth with Block 2 on Communications, her tutor had helped her feel more at ease.

Even at this early stage Carol's horizons had begun to widen. She had been determined to have a career rather than return to mundane clerical work, and had thought of entering computing and new technology. Since starting the course she had been keeping an eye on local job advertisements and felt that there might be more scope than she had been aware of - new companies entering the area needed research staff at all levels for instance.

At summer school she felt amazed at how much she'd changed - breezily coping with being away from home on her own, confident enough to leave her partner in experiments because he insisted on doing it all, and changing to another. Her continuous assessment so far had been very satisfactory, although she thought she had spent much time on it. Her fellow students at home (all male) accepted her completely.

She worked hard, never missed tutorials, took an active part in the self help group and clearly took it all seriously.

Carol passed her course and gained the Technology foundation credit. She had planned to study TM282 Modelling by mathematics in her second year as she needed to consolidate her maths background. However on receiving the first mailing of course material she panicked and rang the WIT office to say she thought she'd chosen the wrong course and maybe she should have a year away from study and return in 1987, especially as her husband had a new job and was unable to give the same level of support. It seemed like a classic case of pre-course nerves. Fortunately we were able to call on an ex-WIT student who had studied two computing courses and was now a tutor on TM282. She herself had experience of all the feelings of initial inadequacy herself, and so was able to give Carol a reassuring but realistic counselling session by telephone. As a result Carol changed to M252 Computing and computers and up to April was making very good progress.

Carol is an example of a lively determined woman with only a low level of previous educational achievement who seized the opportunity to study in a completely new area and is now well on the road to achieving her aim.

10.2 Drop-Outs Case Studies

Wendy was a single parent with four children living with her, in a rural area of Cornwall. She withdrew early in the course and had given up studying by May. Her case history illustrates the difficulty single parents can have in getting the practical support necessary to keep going with a course as demanding as the Open University foundation course. Her early difficulties also suggest that she had been unrealistic when she applied about the amount of time and effort necessary, and her circumstances were such that when she began to fall behind with the work there was no support for her to draw on.

Wendy left school with three A levels in arts subjects. She had gone from there to work in a bank, but she had only worked there for one year. Since then she had a sequence of temporary work. This was the sum of her employment experience, and when she applied for the WIT scheme she was then 33. Since her work in the bank she had been a full-time wife and mother.

When she applied for the bursary she was for the first time in years thinking of returning to employment as her youngest son was preparing to start school. However she had only the vaguest notion of the sort of field she might enter:

"I am very keen to return to work within the next three years (my son will be starting school full-time after Christmas) and I am convinced that I will have a better chance of employment with some knowledge in the technical field."

She knew that she did not wish to return to work in a bank. She was not helped by living in an area of the country where there was little work, although in principle she would not have minded moving. She had begun to think about retraining and had looked at the local TOPS courses, but they did not have anything she wanted. Her ambition was to get a part time job in a "year or two".

Because of her financial position, on supplementary benefit, she could not afford to fund any course herself, and so the bursary scheme seemed very attractive.

Although she had no background in the area, she felt that she was intelligent enough to cope with it. She also felt that she had time to study:

"Although my previous qualifications are in the Arts category I think that I have the intelligence and enthusiasm to pursue the T101 course. I also have lots of time to devote to studying, in fact at the moment I have more time than I know what to do with."

Unfortunately her enthusiasm was not great enough to carry her through. By April she was complaining of finding the course difficult and getting behind. She had submitted three pieces of course work by then and had achieved above average grades. However at the time of her interview she had missed the next assignment and never caught up. She hadn't been able to get to any tutorials at her study centre because of poor public transport. She did not keep in contact with any of the other students who were at the preparatory weekend with her, although at least one phoned her. She knew no-one locally doing the course. She had phoned her tutor a couple of times and although she described him as being very friendly she didn't find he was much help with her problems, one of the most crucial being that she found that she could not get down to concentrate.

The region was alerted and her tutor-counsellor made several attempts to contact her and offer special help. These were initially unsuccessful - it was later discovered that she had moved. When contact was finally re-established by the end of May she felt so overwhelmed by personal circumstances that it was impossible to catch up on her studies, and she officially withdrew.

Vera is also a single parent with two young children. Her previous qualifications were six O levels and a one-year diploma from a local technical college in Hotel reception and book-keeping. She had six years' experience of general office work and self-employed shop management. At the weekend preparatory course she was enthusiastic and determined to succeed in her efforts to retrain, embark on a new career and become financially independent.

The WIT bursary came at a good time. She had been looking for a technology retraining course for over a year, and had applied for a place on a computer course provided by a local firm and aimed specifically at women. Unfortunately it was cancelled because of lack of interest. Looking back she may well have taken on too many commitments, since she had also accepted a place on a six-month part-time ITEC course and was working a few hours a week as a care assistant in an old people's home, to augment her family income. While things went smoothly she was able to cope with all these demands. But a month after the course began she was obliged to spend three weeks flat on her back with a slipped disc. (Her care assistant work involved lifting and turning the patients.) She completed her first two CMAs by asking a friend to complete the form on her instructions, but although she completed the study for this section she was physically unable to write her tutor-marked assignment.

Nevertheless, with support from her mother and a friend, and a rescheduling of submission dates by her region, she was working hard and catching up. Four satisfactory assignments were submitted, and the outlook was optimistic. Then in July her mother was diagnosed as seriously ill and hospitalised. Vera went home with her two children to look after her father and elderly grandfather, and plan for her mother's future lengthy convalescence.

Vera's experience illustrates the vulnerability to unexpected emergencies of a woman in this position.

Sonia had been on a training scheme for computer programming the year before at a local ITEC. She felt the WIT scheme would build on this and further her ambition to teach computer awareness, programming and electronics. She had become aware of a shortage of women electronics tutors. About the same time as T101 started she was approached by an LEA adviser who needed tutors immediately for basic computing at a new adult centre for the unemployed.

The demands of a new part-time job for which she had no previous experience and the need for detailed preparation seriously encroached on her time and energy, nor had she realised the amount of work necessary in the early stages of T101, particularly in maths. She satisfactorily completed the first two CMAs, but in spite of extra help from her tutor-counsellor and a rescheduling of her TMA submission, she finally withdrew in early May.

CHAPTER XI SUMMARY AND RECOMMENDATIONS

Summary

1. The project is attractive to women who wish to move into the technological area from other educational and vocational backgrounds. [2.1, 2.3]

   (a) It recognises the special needs of women studying in a non-traditional area.

   (b) The bursary positively encourages non-earning women to see OU study as a realistic possibility since the criteria recognise their specific economic position. [3.5]

2. Most students wanted to retrain in technology because of possible job opportunities. At the time of application they were not clear as to what these might be. The technology foundation course offers women new to the area a broadly-based experience which helps them clarify their aims.

3. The two main issues for women beginning technological study are

   (a) lack of confidence

   (b) awareness of almost a complete lack of technological background [5.1]

   However, failure to complete the course successfully was invariably linked to family/health factors rather than inability to cope academically. [10.2]

4. Advice and counselling at the enquiry and application stage from women technologists is of crucial importance. [2.2] This is confirmed by the experience of women-only skill centres.

5. Distance-learning fitted well with their present circumstances. [3.4] Although the system has clear advantages for women with family responsibilities it can reinforce social isolation. Yet other research has observed that women value greatly personal contact and interaction.

6. The Loughborough weekend is more than a preparatory course

   (a) It has a much greater impact on students' confidence and motivation than they expect. [6.5] For many it is the first time for years they have been treated as individuals.

   (b) Yet it also generates a powerful sense of group solidarity, with common aims and problems. This helps to carry them through the course, particularly since this will be primarily through distance-teaching.

   (c) It also consolidates the continuity of WIT counselling. Students meet the project staff responsible for pre- and on-course advice.

7. The group identity fostered at Loughborough is an important source of support at summer school. [7.1]

8. Tutorial provision, both face-to-face and correspondence, was the aspect of the course most criticised. [8]

9. T101 was highly regarded as a foundation course, [9.1] accessible to students from a wide range of backgrounds.

10. The two women technologists, both experienced T101 tutor-counsellors, provided a specialised counselling safety-net unavailable to other women technology students. They were able to pick up uncertainties relating to the course at a very early stage during the general discussion by telephone offered to all students during March. Either this acted as a 'preventive medicine' policy, or the home region could be alerted to initiate help before the problem became serious.

Recommendations for the Open University

This report is specifically concerned with a minority group entering a non-traditional area of study, and, eventually, employment - women in technology. To some extent the following recommendations would also benefit any students from a non-technological background.

1. Pre-course support meetings should be organised for all women beginning study in technology, possibly on a regional basis.

2. Awareness-raising should be provided for technology tutor-counsellors who may not be experienced at teaching students from a non-technological background.

3. The use of the 'special sessions' procedures for the benefit of such students should be encouraged.

4. The Faculty should expand its efforts to recruit women staff as positive role models.

5. An unequivocal policy statement from the Faculty through to the regions that sexist behaviour from staff or students will not be tolerated. (20% of WIT students experienced this at summer school.) It should be recognised as a threat to individual liberty and autonomy to learn.

REFERENCES

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